REMARKS

The abstract and specification have been amended in order to correct typographical, grammatical and idiomatic errors contained therein. The claims have been amended in order to more particularly point out and distinctly claim the subject matter which Applicants regard as the invention. No new matter has been added.

Claims 1-6 have been rejected under 35 USC 102(b) as being anticipated by or, in the alternative, under 35 USC 103(a) as being obvious over Lancet et al. Applicants respectfully traverse this ground of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a process of preparing hydrogen through the thermochemical decomposition of water wherein coal powders are caused to react with water in the presence of calcium oxide under a condition of a temperature in a range of 600-800°C, substantially without an oxidizing agent added thereto, to reduce the water to form hydrogen. The process comprises the steps of rendering the coal powders and the calcium oxide into impalpable powders to form mixed impalpable powders, feeding steam generated from a steam generator and the mixed impalpable powders to a fluidized bed of a main reactor and implementing thermochemical decomposition of water in the main reactor by causing the mixed impalpable powders of the coal powders and calcium oxide to undergo grain growth in the fluidized bed while adjusting the steam partial pressure in the main reactor so as to enable calcium oxide to form calcium hydroxide.

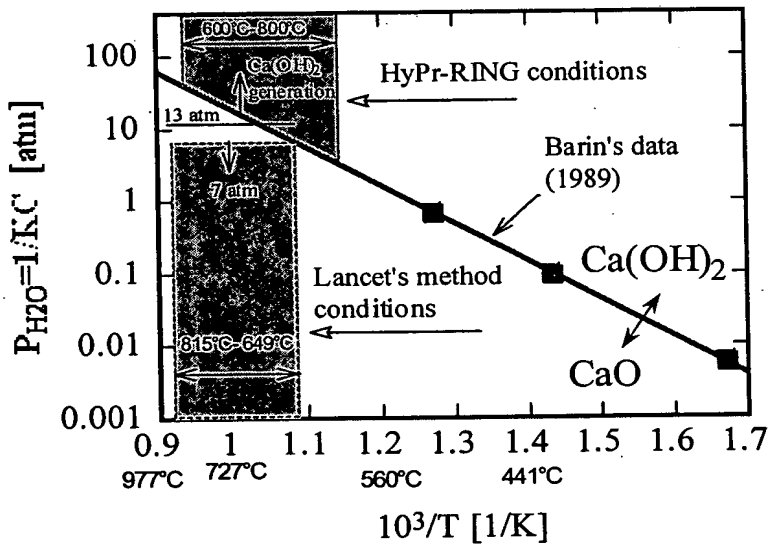
As discussed in the present specification, the present invention is directed to a process for selectively preparing hydrogen through the thermochemical decomposition of water at a high temperature and pressure by utilizing heat generated when oxidizing carbon contained in organic matter. The present invention is based on the discovery that if coal and calcium oxide are provided in the form of impalpable powders, desirable crystal grain growth can be obtained by causing the

mixed impalpable powders of the coal powder and calcium oxide to undergo grain growth in a fluidized bed while adjusting the steam partial pressure in the reactor to enable the calcium oxide to form calcium hydroxide. This enables the recovery of activated absorbent and the rendering of calcium oxide into impalpable powders inside the furnace enables the powder to be fluidized. Moreover, carbon dioxide inside the generated gas is completely absorbed so that carbon monoxide conversion can be completed at a higher operating pressure.

The method of the present invention enables the preparation of hydrogen having a high purity through the formation of calcium hydroxide in the furnace while operating at a higher pressure area where calcium hydroxide is formed in the furnace without substantially adding an oxidizing agent so as to completely absorb the carbon dioxide in the furnace so that the hydrogen/methane ratio is not less than 4/1 and there are hardly any other gases in the formed gas, thereby enabling about an 80% purity of hydrogen. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Lancet et al reference discloses a process of tar destruction during gasification of carbonaceous material which comprises the steps of providing a mixture of finely divided calcium compound of a particle size smaller than 65 mesh and finely divided carbonaceous material of a particle size smaller than 65 mesh, the calcium compound to carbonaceous material ratio being from about 0.5 to 1.0, and contacting the mixture with carbon dioxide and tar exothermally so that the tar is destroyed. The reaction is effected under conditions such that the supplied steam pressure is not more than 13 atmospheres (column 2, lines 20-23) and the formed gas is 3/1 in hydrogen/carbon monoxide ratio (column 1, lines 55-57). This reference does not disclose the control of the steam partial pressure and since other gases are present in the reactor, the steam partial pressure has to be lower than the supplied steam pressure. Therefore, calcium hydroxide does not form as illustrated in the figure below.

Barin, I. "Thermochemical data of pure substances," VCH., Verlagsgesellschaft mbH, D-6940 weinbeim (Federal Republic of Germany), 1989



Variation of reaction equilibrium constant with temperature for $CaO+H_2O=Ca(OH)_2$

As shown in the above figure, the temperature and pressure conditions enabling calcium oxide to form calcium hydroxide is the upper left area over the straight line where calcium hydroxide is stable in the temperature range of from 600-800°C. The present invention allows calcium oxide to form calcium hydroxide by controlling the steam partial pressure in the reactor to allow carbon dioxide to be absorbed and thereby prepare a product gas having a hydrogen/methane ratio of 4/1 to 9/1 with other gases barely being present as shown in Table 1 of the present specification. As such, in contrast to the Examiner's statement, calcium hydroxide is not inherently produced under the reaction conditions shown in Lancet et al. The invention in Lancet et al desires to form a composition of methane which is adjusted to a 3/1 hydrogen/carbon monoxide ratio under conditions where calcium hydroxide is not formed at a lower pressure of not more than 13 atmospheres while partially absorbing carbon dioxide. A large volume of carbon dioxide and methane is present in the product gas and only

about 60% hydrogen, at best, is obtained. In contrast thereto, the present invention produces a product gas having a high hydrogen purity by forming calcium hydroxide in the furnace while operating at a higher pressure area which is higher than the pressure where calcium hydroxide is formed without substantially adding an oxidizing agent and adding a carbon dioxide absorbable material so as to completely absorb carbon dioxide in the furnace so that the hydrogen/methane ratio is not less than 4/1 to enable the product gas to have a content of about 80% hydrogen.

To summarize, the Lancet et al reference does not disclose operating the process disclosed there under conditions to enable calcium oxide to form calcium hydroxide. Moreover, this reference does not disclose the advantages of forming calcium hydroxide with respect to acting as an absorbent for carbon dioxide and thereby producing a product having a high hydrogen purity. Therefore, it is respectfully submitted that the presently claimed invention clearly is not anticipated or obvious over the Lancet et al reference. Reconsideration of the present application and the passing of it to issue is respectfully solicited.

Respectfully submitted,

TFC/smd

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